SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1535.—Vol. XXXV.] LONDON, SATURDAY, JANUARY 21, 1865. STAMPED.... SIXPENCE. UNSTAMPED. FIVEPENCE.

EAST ST. JUST UNITED MINING COMPANY (LIMITED).

A few months since we had to chronicle the successful introtroduction of the Cape Cornwall St. Just Mining Company, a project brought before the public under very favourable auspices to work one of the most eligible pieces of mineral ground in the western part of the county. Our weekly reports will show that the operations have since been carried on with vigour at the surface, while the unwatering the old mine is being proceeded with rapidly; and every day observation but convinces those connected with the management that in a short time there is every probability of a good mine being opened up. Indeed, looking at its geological position (junction of granite and clay-slate) and the number of the lodes contained within its sphere of operation, there can be no hesitation in regarding it as a property of very great importance.

We have this week to announce the formation of a company to work two well-known mines, situated upon the same run of lodes, inland, as Cape Cornwall; and, from the reports appended to the prospectus, it may be fairly considered as a most promising and excellent adventure. All mining men conversant with the district know the properties, which will now be worked with vigour and good management under the title of the "East St. Just United Mining Company;" and although operations have been restricted to the shallow levels, and the lodes not followed down to the depth at which they are likely to be very productive, yet ore to the value of 30,000*l.* has been raised and sold from them.

The improvements effected of late years in the dressing of tin ores, and the general reduction in the prices of those materials used so largely in mines, operate most favourably in the successful development of tin-producing mines; and if they could give profits years ago, when that mineral was so much lower in price than now, and materials higher, it is only reasonable to expect profits in a much greater ratio, especially as an early considerable advance in the price of tin is almost certain.

Reference to the plan of the three mines—Cape Cornwall, St. Just United, and the East St. Just United Mines, will show much better than a mere written description the position of the lodes to be wrought upon, and which, it will be noticed, run through the whole extent of the sett. As we have already mentioned, the operations have been carried on upon a very contracted and limited scale; and the property has evidently never had the fair chance of development it deserves; but we are now glad to see that an influential company has taken it in hand to do it justice.

The St. Just district is, beyond doubt, a first-rate one for tin mining, and has been so for ages. Reference to our list will show what Botallack, Levant, Owles, Boscean, Boscaswell, and a great many other famous mines have already given in profits to their shareholders, in previous as well as in present workings; and it is also very gratifying to observe that those mines recently established all look well in the future, and will, no doubt, give additional evidence of the value of the mineral deposits of this district when they shall be sufficiently developed.

As a rule, the district of St. Just has been very remunerative to the mining community. The profits made years back by the Levant and Botallack Mines will bear comparison with some of the Wheal Vors of the present day; and this, it must be considered, with all the disadvantages which existed at that period, to say nothing of the price obtained for the produce when mines were worked by the old men, and the stuff brought to grass by kibbles and horse-whims, instead of skips and steam, and trammed to the adjoining never-ceasing steam-stamps, instead of being carted on mules' backs to distant and *effete* water-stamps—they did pay even then; and now referred to as brilliant examples of success, and adduced as evidence of what enterprise and perseverance will do.

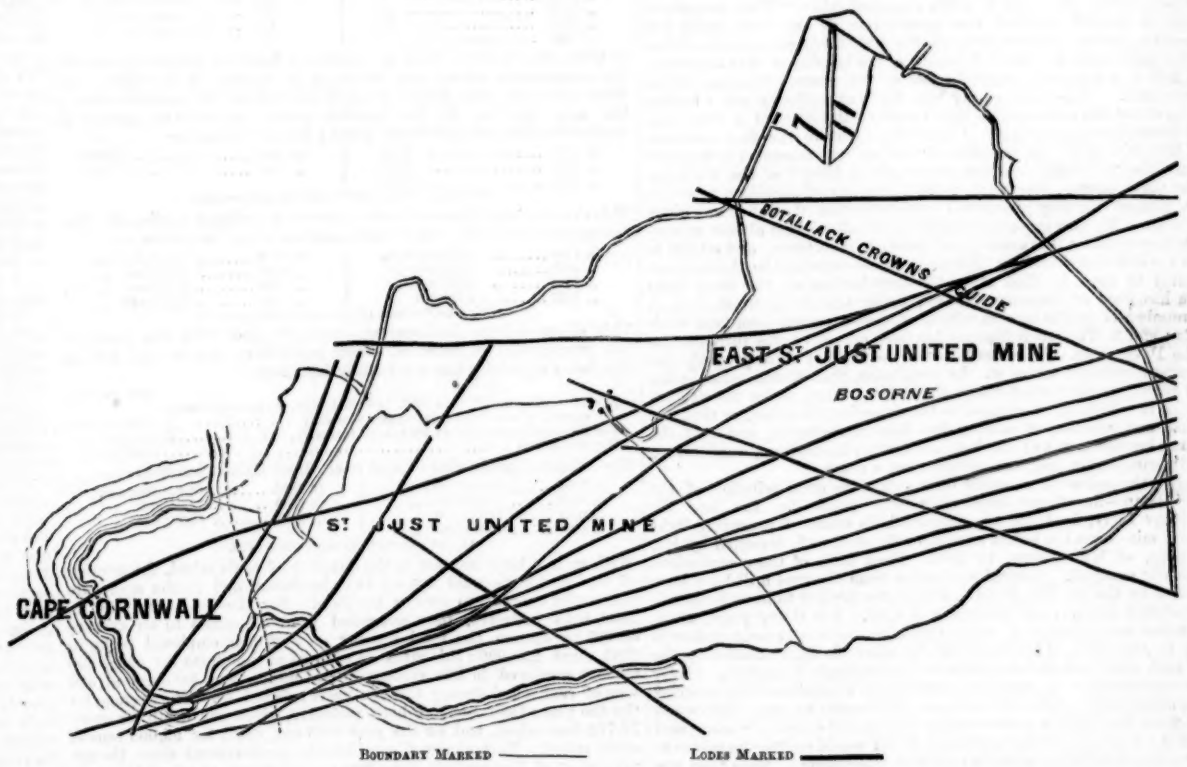
St. Just has only within the last two or three years been brought before the general public as a good district, the old mines being worked by local shareholders. The mines, which are principally held by London and provincial shareholders, are the Cape Cornwall, St. Just United, and St. Just Consols Mines, all of which will, no doubt, support the *prestige* of the district when they are powerfully laid open. Mines cannot be made to pay dividends without the expenditure of both time and capital, and it is the steady and consistent holders *in good properties* who reap the reward. The best mines, it will be found, in the county, with but few exceptions, are those which have been liberally worked *(not extravagantly)* and patiently developed. The lodes at St. Just do not often turn out *so remarkably* "rich" as in other districts perhaps; but then the cost of working them must be considered. The "country," as the miners call the surrounding rock, is easy to work, and cheaply taken away, so that lodes of low produce *here* give good profits, which elsewhere would only entail loss. Hence it is that some half-a-dozen mines at St. Just have given as much as *half a million sterling in profits*. We are, however, gratified to observe that the lodes which are in the "East St. Just United Mines" are of much richer quality than the average, and this fact is specially remarked upon by Capt. Goldsworthy in his report. We have ourselves seen some very splendid stones of ore broken from two of the lodes, and can testify as to their character and value.

The East St. Just Mines are reported upon in the most singularly favourable manner by Capt. Boyns, of the celebrated Botallack; Capt. Carthew, of the St. Just; and Capt. Goldsworthy, of Cape Cornwall Mines. To these we have pleasure in drawing attention, as being at once earnest, conclusive, and free from exaggeration. We may add that Capt. Henry James, of Redruth, Capt. Williams, of St. Just Consols, and others also, speak highly of the prospects of the undertaking. But the most practical evidence of what is the presumed value of the property is the circumstance that nearly the whole of the shares have been already subscribed for. The majority, we understand, were taken by parties acquainted with the property, and, as will be seen, applications for the remaining shares must be sent in speedily, as the share list closes next *Saturday, the 28th inst.* We must not omit to state that the shareholders will receive a dividend of 8 per cent. upon their outlay for the first twelve months, so that they will have the benefit of two years' workings for the subsequent dividends.

In conclusion, we can only refer our readers to the prospectus, which is published this day, for the *first and last* time, in our columns, and we have sincere pleasure in wishing success and prosperity to the "East St. Just United Mining Company."

PLAN OF THE EAST ST. JUST UNITED MINES,

SHOWING THE LODES RUNNING THROUGH THE SETT.



BOUNDARY MARKED ———— LODES MARKED ▬▬

MANUFACTURE OF GUNPOWDER.

A new gunpowder, which is stated to possess many advantages over ordinary gunpowder, has been patented by Capt. Edward Schultze, of Potsdam, Prussia. It is claimed that this new compound has, for equal weights, from three to four times the strength of gunpowder, that it can be manufactured at less cost, and that its explosive effect is more regular, in consequence of the greater uniformity in the size and character of the grains. Its volatile products being chiefly oxygen, the vapour of water, nitrogen, and a small quantity of carbonic acid, are not offensive to the lungs, whilst those from gunpowder are well known to be exceedingly so. The volatile products from the new powder are lighter than atmospheric air, and quickly disappear; in ordinary gunpowder it is the reverse: in casemates, iron-clad steamers, mines, and other enclosed places this advantage is of great importance. It likewise admits of being manufactured in such a way that it may be stored or transported without any danger of explosion. The fundamental material of the powder is wood, or, perhaps, more properly speaking, woody fibre, which by due mechanical and chemical treatment is converted into an explosive compound. The harder kinds of wood make a more explosive powder, and are, therefore, the best for the manufacture of that kind used for mining purposes.

With regard to the mechanical preparation of the material, the wood to be used is to be reduced, by sawing or otherwise, to thin sheets, or veneers, of about 1-16th in. in thickness, when the powder to be made is for ordinary small arms. As the thickness of these plates, or veneers, determines the size of the grain of the powder, this thickness may be lessened or increased to suit the grains to the purposes to which the powder is to be applied. These plates, or veneers, are then passed under, or through, a punching machine, such, for instance, as is used in the manufacture of cards. The diameter of the punches should be about the same as the thickness of the plates, or veneers, as this gives a regularity of structure to the granular mass of the powder. Any suitable machinery may be used for performing this operation. The cylinders of wood thus formed constitute the parts to be used in the further processes for the manufacture of the best kind of powder. The reticulated plates, or veneers, of wood left by the punching operation can now be utilised by cutting them up into small fragments. The plan found to answer very well is to pass the reticulated plates, or veneers, through rollers furnished with cutters around the periphery, and at about ¼ in. from each other. When passed through such rollers, the plates, or veneers, will be cut into strips of the width, of course, of the space between the cutters—that is, this would be the case if one set of rollers only were used, but he finds the better plan to be to pass a cutting-roller over the plates, or veneers, in one direction, and another across them in a line at a right angle to the former.

The granulated woody material thus prepared is ready for the chemical treatment. The first object is the removal of acids and other easily soluble substances. Into a kettle, by preference of copper, and of suitable size, is to be put as much water, holding 3 lbs. of carbonate of soda in solution, as will freely float 100 lbs. of the cylindrical grains. These grains being introduced and stirred up with the alkaline solution, the whole are boiled together for three or four hours. At the end of this time, the liquid becoming discoloured, is removed, a fresh supply is added, and the boiling is continued for three or four hours more. The grains are then removed and exposed for 24 hours to a current of fresh and cold running water. The next thing is to remove the proteine, albumen, &c. The grains prepared as explained having been dried, are placed in boxes of sheet-iron or other suitable material, having a cullender or sieve-like bottom, and steam passed through them for about 15 minutes; the proteine and albumen are thus separated, and pass off with the water of condensation from the steam. After this the grains are again placed in cold fresh running water for about 24 hours, and then dried. The removal of the colouring matter forms the next operation, which is thus effected. The grains may be treated with a solution of chloride of lime, or with chlorine gas. If chloride of lime be used, about 15 lbs. of the salt is dissolved in about 260 pints of water in an air-tight vessel. The dried grains from the second operation are placed in another vessel, and so much of the solution of chloride poured into it as will entirely cover the grains. After about two hours, keeping the grains constantly stirred during the time, the process will be finished. The grains are then removed from the solution, and washed with cold fresh running water, which is to be brought up to the boiling point, and then removed, and again placed in cold fresh running water for about 24 hours, after which they are to be dried at a moderately high temperature. When chlorine gas is used the grains are placed in a proper vessel, and the gas passed freely through them until the discolouration is accomplished; they are then subjected to the washing described above, when the chloride solution is used, and then dried.

The processes hitherto described are destined merely to clean and purify the woody fibre, which has by this time been brought to a fit state to be submitted to the action of nitric acid. As a preliminary step in this operation, 40 parts by weight of concentrated nitric acid, of a specific gravity of 1·48 or 1·50, are mixed with 100 parts by weight of concentrated sulphuric acid of 1·84 specific gravity, the mixture of the acids to be constantly stirred or agitated for about two hours, when it is to be set aside in some cool place for use. Then in an iron or other suitable vessel, around which cold water should be kept constantly circulating, or by some other appropriate arrangement, the vessel should be constantly subjected to a refrigerating process: 100 parts by weight of these mixed acids are placed, and 6 parts by weight of the grains gradually added, stirring the whole constantly for two or three hours, at the end of which time the operation will be completed. The grains are then separated from the adhering acid by draining them into a centrifugal machine, or by any other process capable of accomplishing the same purpose. The centrifugal apparatus is preferred, as it is well known that moisture can by the action of this machine be promptly and successfully removed. As this machine is well known, and used in sugar-refineries, laundries, &c., a description of it is not deemed necessary. The grains removed from the centrifugal machine are again placed in cool fresh running water for two or three days, then again boiled up in a weak solution of carbonate of soda, and again exposed for twenty-four hours to cool fresh running water, and then dried. This brings the grains to a state in which they may be stored away for the final operation which is to render them explosive.

The grains are rendered fit for the purposes to which gunpowder is usually applied by saturation with a salt or salts, containing oxygen and nitrogen. The salts used in this operation are nitrate of potasse (saltpetre) and nitrate of barytes, the two may be used together, or the former (nitrate of potasse) alone. When both salts are used, a solution of them is made by dissolving 22·5 parts of the nitrate of potasse and 7·5 parts of the nitrate of barytes in 220 parts of water, at 112° Fahr., and stirring up in it 100 parts of the grains prepared as above described, for 10 or 15 minutes. When only the one salt (nitrate of potasse) is used, dissolve 26 parts thereof

in the above amount (220 parts) of water, 67·5° Fahr., and treat 100 parts of the grains in the same manner as when both salts are used. The grains having thus been subjected to the action, the salt or salts containing nitrogen and oxygen in their composition are removed to a room or chamber, having the temperature in its air kept at from 90 to 112° Fahr., where it should remain from 12 to 18 hours, to be thoroughly dried. After this it is dusted by means of a drum or screen. The process is then complete, and the powder ready for use. The proportions given in the preceding description have been found to give the best results, and to yield a powder of the finest qualities, but it is not to be understood that the invention requires a rigid adherence to them in carrying it out; on the contrary, many changes may be made without departing from its spirit, or affecting the principle upon which it is founded. To avoid the possibility of danger, the final process may be delayed, and the materials separately—the grains and the salts or their solutions (nitrate of potasse and nitrate of barytes)—may be transported to the place at which the powder is required, and the final process completed there.

As neither the grains nor the salts separately are explosive, all causes of danger and apprehension from the most difficult transportation over the most distant roads are avoided by this means. The dust produced from the sifted powder by the several operations as desbribed amounts sometimes to 10 or 12 per cent. of the whole mass. To utilise this powder, or dust, it is mixed into a paste with water or gum-water, and rolled, or spread, out into sheets of about ¼ in. in thickness; these sheets are then put under a powerful hydraulic or other press, and reduced to the thickness of the plates, or veneers, already referred to; these sheets are then punched in the same way, and the grains dried, the powder thus produced being particularly applicable for rifled small arms.

ON FATAL ACCIDENTS IN COAL MINES, WITH SPECIAL REFERENCE TO THE USE OF THE MINER'S SAFETY LAMP.

A Paper read before the Rotherham Literary and Scientific Society,

BY PHILIP COOPER, MINING ENGINEER.

This subject is one of very serious importance, and I have been induced to bring it before this Society, from being of opinion that certain remarks, made by the President of the Society, in his opening address at the meeting on October 10, were not correct, and were not supported by the facts of the case. The *Sheffield Independent* of the following day stated that the President said: "With respect to mines, it was known that the introduction of the Davy lamp *had caused an immense increase in the number of deaths in mines*, neutralising, in the inscrutable decrees of Providence, the benefits of that discovery, which it was supposed would be one of the greatest blessings to the human race. There must surely be a charm attending a study having for its object the prolongation and safety of the lives of a very large and increasing population." I cordially assent to the last sentence, and believe it to be the especial duty of colliery managers to study to ensure the "prolongation and safety of the lives" of the workmen under their charge. On them rests a serious responsibility, to which as a general rule they give much better attention than they are given credit for. My own experience leads me to believe that almost universally they consider this question of primary importance, and attend to it to the *best of their ability*. The propositions contained in the sentence objected to are: 1. That since the introduction of the Davy lamp there has been an immense increase, under similar circumstances, in the number of deaths in coal mines, of course arising from fatal accidents; and 2. That such increase has been caused by the introduction of the Davy lamp. Were we to admit the truth of these propositions, we must inevitably arrive at the conclusion that undue reliance has been placed on the perfect safety of the Davy lamp, under the circumstances in which it is exposed to fire damp in coal mines, or that the science and practice of mining has been retrogressive, and that the boasted improvements of the last half century in working, ventilating, and lighting coal mines, is a delusion and a snare.

Before the splendid scientific discovery of the great principle of the safety lamp—the flame impervious wire gauze—by the late Sir Humphry Davy, in 1815, the only available means of procuring light in coal mines was the naked candle, or the steel mill, invented by Mr. Spedding, of Whitehaven, in 1763. From both of these explosions frequently occurred. Several explosions from the steel mill have been recorded by the late Mr. Buddle, who states the first to have happened at Wallsend colliery, on November 2, 1785. For thirty years, then, the miner was compelled, when explosive gas was present, either to work in the dark or by the aid of the miserable light afforded by the steel mill, after well knowing this to be exceedingly dangerous. Under these circumstances, a constant recurrence of explosions fully aroused the sympathies of philanthrophic and philosophic minds. For two or three years the question became a desideratum and a generally canvassed problem: Can a light be contrived which would enable the miner to enter or work with safety in an explosive atmosphere? More than one inventor of a safety lamp soon appeared; Dr. Clanny, in 1813, and the well-known railway engineer, the late George Stephenson, in 1815, both invented a safety lamp, or rather a safety lantern, both of which, by way of experiments, were used in coal mines; but the honour was reserved to Sir Humphry Davy to effectually and safely confine the flame of explosive gas in his beautiful invention, the wire gauze cage, even when surrounded by an explosive atmosphere. A variety of lamps are now in use, Muesler's, Clanny's, Geordie's, Davy's, &c., all of which *now* depend on Sir Humphry Davy's wire gauze for their principle of safety. Mr. Matthias Dunn, the inspector of coal mines in Northumberland, states that "on January 1, 1816, the first safety lamp invented by Sir Humphry Davy was put to use at Hebburn Colliery; and so simple was it in form and principle, that it has, up to this moment (1844), scarcely undergone any material alteration." And I believe I may correctly add that, in *no case*, to this day, has any *Davy lamp*, constructed on the principle recommended by its inventor, and used in that condition, been the cause of explosion in coal mines. Having arrived at the period when the safety lamp was introduced, we may now inquire what was the comparative condition of coal mining before and since that time.

Unfortunately, sufficient data does not exist to furnish a direct and conclusive statistical comparison of fatal accidents for these periods in all our mining districts. However, sufficient data, I think, does exist to induce us safely to admit the fact, that there has been an increase in the actual number of fatalities *from all causes* since the end of the year 1815, and even an actual increase in the number of fatalities from explosions. In doing this we by no means admit that this increase is due to the safety lamp, or even that there has been any increase of fatality *in proportion to the increased quantity of coal raised* in this country. It is from overlooking the immense increase in the production and consumption of coal during the last fifty years, together with the recent collection of correct statistics of accidents in coal mines (inspectors' reports), that the erroneous views stated by the President are so very generally entertained.

The present century has been a most interesting period in the history of this country. During no previous era has there been so great an increase in inventions applicable to the development of manufactures, trade, and commerce. We will briefly notice only those which have aided in the development of the coal trade. Long before the steam engine was applied to the raising of coal, it had become very generally applied to the raising of water from mines. And it is a curious fact, that it was for some time applied to supplying the necessary water for water-wheels by which the coals were raised, before it was applied directly to this purpose. This was only as recent as the beginning of this century. We all know that by the aid of steam the quantity of coals we can now raise is almost unlimited. In 1844, in Northumberland and Durham alone, steam power equal to upwards of 8,000 horses was used for this purpose, and it now probably equals 20,000. By its aid coals can now be raised from almost any depth. This application gave an immense impetus to the production of coal. Rapidly following increased powers of production, we find increased consumption, arising from the extended use of coal. At the commencement of this century the practical application of gas lighting of our houses, streets, and manufactories was all but unknown. Now almost every village has its miniature gas work, and it is also largely applied to the lighting of coal mines. This, then, is really a new source of consumption, since the introduction of the Davy lamp. Almost concurrent with the introduction of gas lighting we have that of steam navigation. Now not only every lake and river, but almost every ocean of the world, is covered by vessels propelled by steam, opening out another large and rapidly-extending application of the products of our coal mines. This also being a new source of consumption since 1815. Thirty years ago, or little more, we could not strictly use the phraseology railway system. How marvellously has this system been developed. Now upwards of 6,000 locomotives are daily in use in this country, all consuming coal, or its product, coke, in a manner unknown in 1815. These new applications of coal have tended to a great increase in the consumption of iron. The produce of pig iron in this country—

In 1788 was only	61,000 tons	In 1827 it was	654,500 tons
,, 1796 it was	108,793 ,,	,, 1845 ,,	1,250,000 ,,
,, 1806 ,,	250,000 ,,	,, 1851 ,,	2,500,000 ,,
,, 1820 ,,	380,000 ,,	,, 1862 ,,	3,943,469 ,,

the manufacture of which must have consumed 12,000,000 tons of coal, at an average of three tons of coal to one of pig iron.

In 1863 ..... 4,510,040 tons

Taking the census returns of 1801 and 1851, we find the increase of the population of this country to be at such a rate as to double itself in 52½ years; or an increase of 100 per cent. in that time. It is curious to observe the increase in some mining districts from 1801 to 1851:—

In the West Riding of Yorkshire it was	132 per cent.
,, Staffordshire	151 ,,
,, Durham	160 ,,
,, Lancashire	201 ,,
,, Monmouthshire	244 ,,

This increase of population as certainly causing the increased consumption of coal as it does that of bread, each person on an average consuming one ton of coal per year. We may add that that wise measure, the introduction of free trade, both indirectly and directly, has tended to the increased consumption of coal. Before 1835, a heavy duty was paid on coal for foreign export, which was then repealed. Gas manufacturing—steam navigation—the development of the railway system—the more extended application and consumption of iron—the principles of free trade—and the increase of population in this country—all of these have concurred to produce an enormous and unprecedented expansion of the coal trade and consequent number of persons employed during the last 60 years, but principally during the last 30 years. The results of this increased consumption of coal will be fully seen by the following facts. For Northumberland and Durham we find the number of collieries in work, at different periods, as follows:—

In 1799	41	In 1840	101
,, 1817	45	,, 1845	129
,, 1828	59	,, 1853	225
,, 1834	64	,, 1863	312
,, 1838	—		

It must also be borne in mind that there has been a great increase in the comparative extent and powers of production of the collieries in those districts—and, indeed, generally throughout the country—during the same period. In the counties already named, the number of workmen employed at different times I find as follows:—

In 1810	9,724	In 1854	38,801
,, 1825	20,954	,, 1863	47,300
,, 1844	33,980		

Being an increase at the rate of 486 per cent.

This shows a large increase in the number of workmen employed. For the same counties the tons of coal raised are stated as follows:—

In 1800	3,000,000 tons	In 1829	4,400,000 tons
,, 1807	3,250,000 ,,	,, 1840	7,500,000 ,,
,, 1815	3,400,000 ,,	,, 1854	16,000,000 ,,
,, 1822	4,300,000 ,,	,, 1863	22,000,000 ,,

Being an increase at the rate of 733 per cent.

This shows a large development, especially after 1829, due partly to the introduction of railways, steam navigation, and foreign export. The latter especially has wonderfully increased:—

	Per annum.
For the eight years 1829 to 1836, both inclusive, the average foreign export of coal from this country was only	460,040 tons.
For the eight years 1836 to 1843, both inclusive, it was	1,376,827 ,,
For 1863 it was	7,529,341 ,,

The estimated production of coal in all Great Britain has been:—

In 1800	10,000,000 tons.	In 1854	64,000,000 tons.
,, 1819	13,000,000 ,,	,, 1859	72,000,000 ,,
,, 1829	16,000,000 ,,	,, 1863	86,000,000 ,,
,, 1840	30,000,000 ,,		

Or 860 per cent. increase since 1800.

With such a large increase in the quantity of coals raised, the number of fatal accidents could not fail to be increased, and in the aggregate necessarily amount to serious numbers. For the ten years 1851 to 1860, both inclusive, they amounted from all causes to an average of 909 per annum, the total number of workmen employed being in 1861 about 250,000; this gives an average of one death for every 250 persons employed in this country in coal mines, and for every 67,500 tons of coal raised during the ten years referred to. The average for the five years 1856 to 1860, both inclusive, gives one death for every 74,792 tons raised, and for the year 1863 one death for 95,000 tons of coals raised. This shows a considerable improvement since the appointment of Government inspectors of coal mines, of whom there are now twelve. Taking the quantity of coal raised as a basis, and taking 1856 to represent 100, the proportion of deaths to coal raised are:—

1856	100			
1857	104·24	Increase,	4·24	per cent.
1858	87·83	Decrease,	12·17	,,
1859	80·32	,,	19·68	,,
1863	93·61	,,	6·99	,,

This, of course, includes all fatal accidents. Adopting the classification of causes of death followed by the inspectors of mines, we have for the five years already referred to 5,095, caused as follows:—

	Deaths.	Per annum.
By Explosions	1,286	25·25
Falls—Coal and stone	1,924	37·75
Shafts	917	18·00
Sundries	968	19,00
Total	5,095	100·00

It will be at once seen that at least seventy-five per cent. of the total deaths caused in and about coal mines arise from causes with which the use of the safety lamp is not connected. Previous to the appointment of inspectors of coal mines, very imperfect statistics exist for comparing the loss of life with the quantity of coal raised. However, we find in the fifteen years immediately *preceding* the introduction of the safety lamp, the loss of life in Durham and Northumberland alone, from explosions only, was one for every 86,000 tons raised, and for the fifteen years immediately *succeeding* its introduction, one death by explosions for 96,000 tons of coal raised. During the five years referred to we find the average rate of death from explosions to be only one for every 300,000 tons raised: although those five years include both the Lundhill and Risca explosions, the most destructive ever known in this country. For 1863 the deaths from all causes are one for every 95,000 tons raised, and for explosions, one for 529,000 tons raised. A summary of these details shows the proportion of deaths by accidents from all causes to coal raised, 1800 to 1863, as follows:—

Average of	1809 to 1815,	1 death per	43,000 tons.	Proportion,	100·0	..
,,	1815 to 1822,	,,	48,000	,,	89·5	Decrease, 11·0
,,	1850 to 1855,	,,	60,000	,,	71·6	,, 29·0
,,	1855 to 1860,	,,	75,000	,,	57·3	,, 43·0
,,	1863,	,,	95,000	,,	45·2	,, 55·0

Or, to the present time, a reduction of fatal accidents of 55 per cent.

PROPORTION FROM EXPLOSIONS ALONE, 1800 TO 1863.

Average of	1800 to 1815,	1 death per	86,000 tons.	Proportion,	100·0	..
,,	1815 to 1830,	,,	96,000	,,	89·6	Decrease, 11·0
,,	1854	,,	275,000	,,	31·3	,, 69·0
,,	1860	,,	215,000	,,	40·0	,, 60·0
,,	1863	,,	529,000	,,	16·2	,, 84·0

Decrease, 84 per cent., from 1800 to 1863.

The primary cause of explosions is the accumulation of gas. In most cases this gas issues from the coal and surrounding strata in such quantities as can be easily and safely managed with proper ventilation. Sometimes it issues in large quantities and with great violence; and under such circumstances, if naked lights are used, an explosion is inevitable. Perhaps this may have been the cause in one or two cases of explosion where naked lights were used; but as a cause, it is really an exception, and not the rule. The great difficulty in mining, as it regards ventilation, is, and always has been, the goafs or gobs, where the coal has been entirely extracted. These parts become a mass of ruins, which it is impossible to ventilate thoroughly, so as to render it safe to work on their margin without safety lamps. When every care is taken to ventilate these goaf edges on the best known principle, gas will often be found a few feet above the level of the bed of coal. The gas accumulated in these places has been the cause of nearly, if not all, the great explosions in recent times. Where a mine yields gas in the goafs or gobs, they cannot be worked with any degree of safety except with the safety lamp. It is the neglect of this, and this alone, that has caused all the most serious explosions of the last twenty years. In support of this opinion, I quote the words of the late Government inspector, Mr. Mackworth, who says "that 72 out of 73 explosions, and 171 out of 172 deaths, were attributable to the use of naked lights, and that out of 1,154 deaths from explosions, reported in five years, 12 only occurred where safety lamps had been used, all of *which were in a defective state*;" and Mr. Kenyon Blackwell also says that "out of 1,099 deaths, 7 only were with safety lamps," and adds, that *no instance has been properly authenticated of explosion from a proper safety lamp*; and in the most dangerous mines in England, where the discharge of fire-damp is greatest, but where locked safety lamps are exclusively used, explosions are almost unknown."

It is not, then, the use of the safety lamp, but the non-use of it, that has been the principal cause of the loss of life by explosions. And the only way to prevent their recurrence is to confine the lighting of coal mines where explosive gas is evolved in the goaf—except perhaps in the main intake air currents—to the safety lamp. This is becoming more general, and it would be well were it enforced in every colliery yielding explosive gas. The great difficulty in doing so is the prejudices of the workmen. The cost of lamps is nothing compared with the risk connected with the use of naked lights; but some persons feel it a difficulty to incur the expense and the trouble with the colliers, whilst a neighbouring colliery is content to take it easy and run the risk. The cost of Lundhill explosion to the owners alone has been stated to have been 20,000*l*., and Mr. T. Y. Hall, of Newcastle, gives a case which cost from 40,000*l*. to 50,000*l*. No doubt more coals are now raised from a single mine than ever there was before. Indeed, this is indispensably necessary, and it is becoming constantly more so. At the same time, great improvements have been made in the science and practice of ventilation. From 1800 to 1815 about 6,000 cubic feet of air per minute was considered a fair quantity for an extensive mine, through which it crept sluggishly along in one unbroken current for a distance of thirty miles or more. About the year 1823 the greatly improved mode of splitting or dividing the air into a number of currents was adopted in the North of England. This has been found the greatest improvement ever introduced in ventilating coal mines; so much so, that where it is judiciously carried out, 100,000 cubic feet per minute is no unusual quantity of air in a single colliery. The great objection to the safety lamp is the little light it affords. This is a real difficulty; but notwithstanding this, many of the largest collieries in the kingdom are being worked solely with safety lamps. Some persons object to the use of gunpowder where lamps are being used. No doubt the safety would be further increased by not using it. However, where this is attended to by properly-qualified persons only, the risk is reduced in the proportion of a few minutes as compared with the whole of the day, where naked lights are used. The most serious objection is, that too much reliance might be placed on the lamp, to the neglect of ventilation. This, however, ought not to be. Indeed, the present law affecting coal mines provides; that "an adequate amount of ventilation shall be constantly produced in all coal mines or collieries and ironstone mines, to dilute and render harmless noxious gases to such an extent, that the working places of the pits, levels, and workings of every such colliery and mine, and the travelling roads to and from such working places, shall, under ordinary circumstances, be in a fit state for working and passing therein."

It has become too much the fashion of the present day to speak of all fatal accidents in mines as the result of carelessness on the part of colliery owners or their officers. It is too general to talk of the sufferers being slaughtered and sacrificed, and of the mines being catacombs. We have no means of comparing the fatal accidents in mines with those of other dangerous occupations, such as workmen in manufactories, railway navvies, persons employed on railways, sailors, &c., but it is certainly a fact that *all* the lives lost in coal mines are not in excess of those in other occupations. By a very recently published report, we find the excess of death amongst the mining part of the population, including all violent deaths, is only some 4 per cent. more than that of other labourers in the north of England, and it is at some places 50 to 100 per cent. below that of Cornish miners, where explosive gas is never met with. Unquestionably, the occupation of a coal miner is a very dangerous one. They are exposed, in addition to the ordinary dangers on the surface, to that of descending deep vertical shafts, falls of coal and stone, injuries on underground railways, and explosions of fire damp; every person descending a coal-pit being exposed to the risk arising from all these causes. Whilst fully admitting that the risks to which a miner is exposed are very great—much greater than is generally supposed—we, at the same time, contend that the amount of risk greatly depends on the care and judgment of the workman, and can only be avoided by his own exercise of prudence. According to the extent of the means available for the prevention of accidents, they may be properly classified as follows—viz.: 1st. Where the miner is alone responsible; 2nd. Where the owner or his servants are alone responsible; 3rd. Where they are jointly responsible; and 4th. Where the occurrence is purely unforeseen and accidental. In a large proportion of accidents, by being crushed by corves or wagons, by falling into shafts, by being crushed in shafts, where no derangement of the working parts previously existed, by falls of coal, and by falls of stone, the only possible means by which the accident could have been prevented, must be stated to be the exercise of judgment, prudence, and care on the part of the workmen. In cases of explosion the case is widely different. Seldom is there more than one sufferer in the least degree connected with the origin of the explosion, and that most frequently only as a sufferer. In almost every case the cause is to be found in the use of naked lights. No great explosion which has hitherto occurred can either be attributed solely to the sudden emission of gas or the use of the safety lamp in a perfect condition. Very rare indeed have been the accidents arising from the use of defective lamps.

In these remarks, purposely condensed, to prevent the undue extension of this paper, I have endeavoured to show that accidents from explosion are not due to the use of safety lamps, and that the number of accidents arising from explosions are much less, in proportion to the quantity of coal raised and persons employed in coal mining, since the introduction of the safety lamp than it was previously, notwithstanding the increase in the elements of danger; also that accidents in general are fewer in proportion than at any previous period; and also that of those now occurring any considerable reduction can only be effected by increased vigilance, care, and prudence on the part of the workmen, and by the careful selection of prudent officials, as it is always found that this produces a general habit of care and caution on the part of the workmen; and also by the extended use of the safety lamp, which has been one of the greatest possible blessings to this country, and has preserved the lives of great numbers of the mining population of this country. We will feel the subject is one of the greatest importance when we consider that for every colliery fatal accident on the average one child is left fatherless, and for every two one wife is made a widow. We thus find that annually from fatal accidents in coal mines, on the average of the last few years, 500 widows and 1,000 children have been bereaved of their husbands and fathers, and left without their natural guardians and support. That this great loss of life and suffering is not much greater, is due to the partial, and only partial, use of the safety lamp nearly fifty years after its invention. In 1813, two years before the introduction of the safety lamp, Mr. Buddle calculated that the deaths by explosion were equal to those from all other causes. Did the same proportion now obtain, the fatalities from coal mining would be at least 1,500, instead of 1,000 a-year, and the widows and children left in proportion. Were the use of the safety lamp more rigorously enforced in explosive mines, the average number of accidents would probably not be more than half this number, or 750 per annum. Of all the great contributors to the development of trade—mostly during this century—Watt, the steam engine—Symington, steam navigation—Murdock, gas lighting—Dudley, the application of coal, and Neilson that of the hot blast to iron making—Stephenson, railways—Bessemer, steel manufacture—Sir Robert Peel, free trade—none are more deserving of having their name handed down to posterity than Sir Humphry Davy, whose name will be in perpetual remembrance so long as coal mining exists aided by the Davy lamp.

The necessity of using the safety lamp in coal mines arises from the issue of explosive gas in working them. Generally it issues in minute quantities from the pores of the coal. Occasionally it issues with great violence from fissures in the coal and surrounding strata. These are

called blowers. I have heard the noise caused by gas issuing in this manner at the distance of 300 to 400 yards. Fortunately, this mode of issue is unusual. However, the ordinary force of issue has been proved, in some cases, to be equal to a pressure of 4½ atmospheres, including that of the ordinary pressure of the atmosphere. The force exerted by the ordinary issue of fire-damp, even in small quantities, opens out an interesting subject of inquiry. What is the normal condition of gas in situ? Can it be in a liquefied condition? Professor Faraday succeeded in liquefying, by carbonate of hydrogen gas, with a pressure of 39 atmospheres, with a temperature of — 77 deg. Farenheit. He could only liquefy this, but he could solidify carbonic acid gas. No doubt it is found in those states or conditions free, moderately condensed, and excessively condensed. The quantity of gas evolved varies considerably, and, as a general rule, it seems to increase with the increased depth of the coal bed. The late Mr. Thomas John Taylor calculated that at Wallsend Colliery, an isolated tract of coal-bed fifty acres in extent, supplied in nineteen years a quantity of gas which would fill the whole space occupied by a bed of coal five feet thick and 3,040 acres in extent. The force of issue under ordinary circumstances has been tested to a pressure exceeding 40lbs. per square inch, when the arrangement failed; therefore it did not test the utmost limits of pressure or force of issue. This gas is known to chemists as the bihydruret of carbon, and is composed of two atoms of hydrogen and one of carbon, its specific gravity being little more than half that of the atmosphere. It is more or less explosive in proportion as it is mixed with the atmosphere. When it forms 1-30 to 1-15 of the atmosphere it will not explode, when 1-14 its inflammation extends throughout the gaseous mixture without loud detonation. The rapidity of inflammation increases with the proportion of the gas to a certain point, 1-9 or 1-8 forming the most highly explosive mixture. With a further increase of the gas the mixture becomes less and less explosive, and ceases to be explosive when the mixture contains more than 1-3 of gas. This accounts for the difference in the violence of explosions. It will be observed that a mixture of this gas of less than 1-10 of the atmosphere of the mine forms a highly explosive compound, but we must remember that in well-ventilated collieries of the present day, it is not unusual to have circulating 100,000 cubic feet of air per minute; and as a mixture of 1-15 or more than 6,000 cubic feet of explosive gas is required per minute to render the whole explosive, there is no great probability of this being so, except under very unusual circumstances. The case of Wallsend, already referred to, never yielded more than 100 cubic feet per minute for fifty acres of partly worked coal-bed. It is not, then, the ordinary discharge of gas from the coal-bed that is productive of the greatest amount of danger; it is from the sudden issue of large quantities of gas from the coal, &c., or from that generally collected in the higher and most inaccessible parts of the gobs, or goafs, which is liable to be driven out into the surrounding air currents in large quantities, in a limited time, by the sudden settling of the superincumbent strata over large areas. This will appear more clearly when we consider that one acre of goaf space one foot thick will contain 43,560 cubic feet of gas, and six acres only one inch thick will contain one half of this quantity, or 21,780 cubic feet—the whole of which might be suddenly expelled into the surrounding air currents and workings by a sudden settling of the roof. Such is clearly not at all an improbable occurrence, and I believe fully accounts for almost all the sudden issues of gas which have been known in this district.

To persons conversant with mining it will be clear that this mode of reasoning explains equally sudden issues from the floor as from the roof of goafs. We thus see the mode of issue and circumstances of accumulation of gas in coal mines. Generally speaking it is a small but constant issue, but sometimes it may, and no doubt does, suddenly render considerable currents of air explosive. The first may be called the ordinary, the last the extraordinary circumstances of issue. In the former the lamp ought not to remain. Indeed, it is unnecessary that it should. In the latter case it may be some time before it can be removed to a part of the mine free from explosive mixture. We thus see conditions under which the lamp is exposed to explosive mixtures of gas in coal mines. It is fortunate that, as stated by Sir Humphry Davy, fire-damp is much less combustible than other inflammable gases, and that it will not explode from red-hot charcoal or red-hot iron. It requires iron to be white hot, and itself in brilliant combustion, for its inflammation. The heat produced by it being also much less than most other inflammable gases, and hence in its explosion there is much less comparative expansion. In this repect it differs greatly from gas distilled from coal, or ordinary street gas, which is easily ignited by iron at a low red heat. After various experiments with this latter gas, the most highly explosive of the two, Sir Humphry Davy says: "I found that iron wire gauze (or what he calls his flame sieve), composed of wire 1-40th to 1-60th of an inch in diameter, and containing 28 wires, or 784 apertures to the square inch, was safe under all circumstances in atmospheres even of this kind, and I consequently adopted this material in guarding lamps for the coal mines, when in January, 1816, they were immediately adopted, and have long been in general use." The principle on which the wire-gauze prevents the passage of flame when in an explosive mixture in a coal mine, is stated by Sir Humphrey Davy to be its cooling property, whereby the temperature is reduced below that of flame. He states the temperature of even red-hot iron-wire to be far below that of flame. This is a piece of wire-gauze from which lamps are made, having apertures exactly the same as that described by Sir H. Davy—viz., 784 per square inch. You will perceive on holding it over this coal or street gas burner it prevents the flame from passing; exactly the same as the wire-gauze cylinder of the lamps. The air passing through the gauze is very hot, and converts this paper into charcoal. It is also explosive, for it ignites at this flame, but it has been cooled below the explosive point, by passing through the gauze, and would be so with the gauze even at a red heat, and fire-damp wire used. This arises from its being mixed with a quantity of comparatively cold air, and by the cooling influence of the iron-wire gauze. I have already said the gas met with in coal mines is not near so explosive as coal gas; indeed, it requires for its ignition iron to be at a white heat. The circumstances to produce this are not likely to occur in coal mines; indeed, I question if it ever has occurred. Of course a rapid current of explosive mixture heats the wire gauze much more rapidly than an atmosphere at rest. The inventor states the lamp "to be safe in all currents of fire-damp, as long as it is not heated above redness; but if the iron wire be made to burn as at a strong welding heat, it can be no longer safe;" and he adds, "although such circumstances can never happen in a colliery, yet it ought to be known and guarded against." Extremely rapid motion of the Davy lamp, sustained for half a minute, has been proved to pass the flame. Davy proved this at a strong blower of mine gas piped to the surface of Murton west pit, in September, 1816, as published by him in 1818. The gas issued through a pipe less than half-an-inch in diameter, which, of course, formed a most powerful blow pipe, from which the gas issued with great violence, and when ignited, made an intense flame five feet in length. Into this current the Davy lamp was placed, but did not communicate explosion, so long as it was only red hot, and moved slowly through the current. But when it was placed at the point of most intense combustion, it reached a welding heat, the iron began to burn with sparks, and then the explosion passed. So late as 1835 this was so little known, that on Mr. Buddle stating it before a Parliamentary committee, there were many who doubted the truth of the assertion. The curious in such matters can see Davy's account of this, printed in London, in 1818.

All present will now, I think, be able to form a pretty correct opinion of the principle and requirements of a good safety lamp.

This is the ordinary Davy lamp as now generally used. The gauze is made of iron wire, containing 784 meshes or apertures per square inch, as it is now required to be by Act of Parliament. It is of course liable to be tampered with, or damaged, or, although extremely improbable, perhaps to be exposed to the circumstances already explained. Under all other circumstances it has stood the test of nearly fifty years' daily use, under all the circumstances of coal mining, without a single failure. The gauze inside is six inches high and one and five-eighths inches in diameter.

This Stephenson's lamp depends on the wire gauze for its principle of safety. It has an interior glass cylinder, by which the flame is protected from currents. It is more quickly extinguished when placed in an explosive atmosphere than the Davy. The objection to it is the liability of its glass cylinder being broken, after which the capacity of the lamp is considered too great for perfect safety. The gauze is six inches high, and two inches in diameter.

This is the Clanny lamp, its principle of safety also being the wire gauze. For affording greater light, the flame is surrounded for some length by a glass cylinder only. The liability of the glass to fracture under circumstance of danger, is to many persons a fatal objection to its use. Fatal accidents have occurred from this cause.

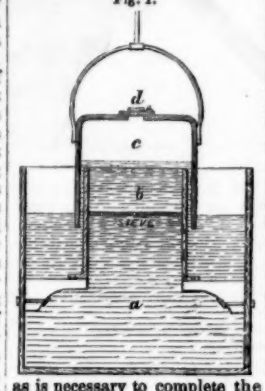
The Muesseler lamp is similar, and is much used in Belgium. It is objected to on account of its complexity, in addition to the glass cylinder, similar to the Clanny.

IMPROVED HYDRAULIC JIGGING MACHINERY.

Among the improvements made during the last year in the separation of ores in Prussia, we notice an improved hydraulic jigging machine, invented by Mr. Roth, of Saarbrücken, which has in practice proved highly advantageous, especially in materially lessening the manual labour of the workmen; it will, therefore, be interesting to give a short description of it.

The invention consists in the use of a moveable bell, which overhangs and covers the fixed box-sieve, the bell being hermetically closed on the upper end and open on its under side; when moved up and down the atmospheric air causes the rising of the water in the sieve, whereas in other hydraulic jigging machines a wave of water is brought up against the bottom of the sieve by plungers under or at the side of the sieve. Without departing from this principle, the new jigging machine has been worked of two different constructions, which are shown in the annexed engravings

Fig. 1.



partly in sectional elevation and partly in front view. In fig. 1, *a* represents the barrel, which contains the fixed box-sieve *b*; *c* is the bell, made of strong sheet-iron, and provided with a sufficiently-loaded valve, *d*—in place of this valve a cock can, if desired, be used for the outlet of the air. The bell is moved up and down; at the upward motion the air under it is attenuated, and the water is forced by the pressure of the atmospheric air through the sieve, lifting the stuff thrown upon it; moved downwards, the water sinks to its original level in the barrel, and the minerals fall back on the sieve, separated according to their specific gravity in different divisions; it is necessary, however, that the lower end of the bell remains covered by the water in the barrel. The bell is counterbalanced by an equipoise, and by two handles it is moved up and down as often as is necessary to complete the separation of the minerals in the sieve. The bell is elevated by the aid of the equipoise, in order to clear out the

Fig. 2.

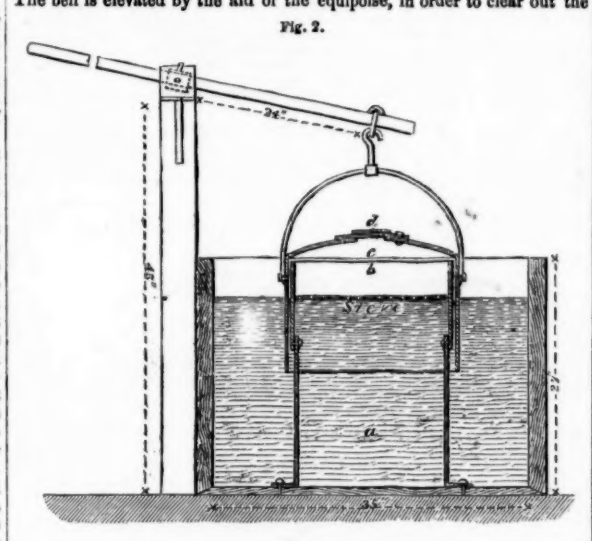
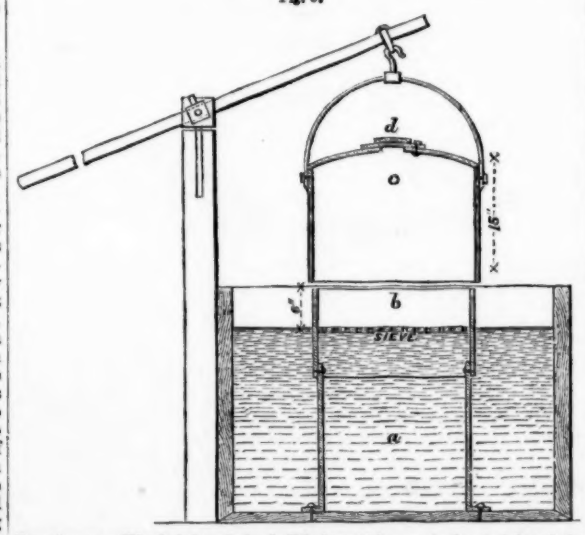


Fig. 3.



jigged ores. The height of the bell being 15 in., and the height of the frame of the sieve only 8 in., it suffices to fill the water in the barrel only to the level of the sieve; the divisions of the jigged ores can, therefore, be cleared out in a dry state, without any water escaping out of the barrel.

As to the action of the machine, the stuff must be prepared as usual, and is brought in the sieve before the bell is first drawn down; the manual labour is also just the same as with the common jigging-machine with moveable sieves. In Figs. 2 and 3 the machine is somewhat differently constructed; in these figures the same letters represent the same parts of the machine as in Fig. 1: for the motion a lever is used, which is attached to a horizontal and a vertical axle, to be moved as well up and down as to and fro above the sieve. The bell is made in this case of sheet zinc, but has a strong sheet-iron cover.

As to the result of trials with machines of the latter form, the work performed was greater with the lever than with the equipoise mentioned, and greater than that of the other jigging machines on the mine. The necessary shock for the motion of the bell varied between ¼ and 1 inch only, and the jigging was much less laborious for the workmen.

As to the action of the latter machine, it is just the same as at break jigging; the bell being at first elevated over the frame of the sieve, and turned aside; the stuff is thrown into the sieve, and the bell lowered over it; the workman then moves the bell up and down, with the aid of the lever; afterwards the bell is again elevated and turned from the sieve, to clear out the jigged ores in a dry state. The advantages of the improved jigging machine consist, as is obvious, in materially lessening the manual labour of the workmen, in avoiding the fouling of the water of brooks, and that one barrel of water suffices for jigging a great quantity of ore. It may be added that the requisites for cleansing the ores well by the improved jigging-machine are, that the sieve lie horizontally, and be fixed immoveably in its frame; that the shock be regulated according to the size and tenacity of the stuff, and that the valve or cock close hermetically. It is, doubtless, desirable to have a continuous jigging machine for the separation of ores, such as are used with good success to wash the coal. This desideratum will, doubtless, be at some time solved; in the meanwhile, it is important to notice all efforts made to improve our present system of jigging ores, provided they show any advantage in practice.

FOREIGN MINES.

COPIAPO.—Checo Mine, Nov. 30: Estimated produce—

Class.	Quantity.	Quality.	Price.	Value.
First class dark ore	64	30	$28·75	$230
Second class dark ore	448	15	10·50	588
Third class ditto	256	10	5·10	160
Third class smalls	192	10	5·00	120
Total	960			$1098

In the 70, east of Price's shaft, the south lode in this chiflon is still poor; in this chiflon the lode is 2½ ft. wide, and the ground about it is looking a little more favourable. In the 60, at Price's shaft, on main lode, this chiflon is now communicated with the 75 fm. level end driven from the cross-cut from the bottom of Price's shaft, therefore we shall now continue to drive the 75 fm. level end, west of Price's shaft, and again sink the 75 chiflon; in both of these places the lode is very kindly, and producing some good stones of ore. In the 65 chiflon, sinking west, on main lode, the lode is a little improved since our last, producing some rich stones of metal, looking very favourably. In the 40, west of Price's shaft, on south lode, the branch is much the same as when last reported.—Western Sett: In the 40, in the cross-cut driven, we have cut the lode, and it is poor.—G. MATTHEWS.

RHENISH CONSOLS.—Geo. Sweet, Jan. 7: Bleibach: I am glad to tell you that our wheels are again working, both shafts are drained, and we shall commence cross-cutting towards the different lodes at once. The small lode at Wright's, in the end driving west, is without alteration. No. 1 stope is not altogether so good, in consequence of the lode being in contact with the largest cross-course. In No. 2 stope there is an excellent lode. We have sunk in the bottom about 1¼ lachter, but there is so much water that I am afraid we shall not be able to continue the sinking till the lode is intersected at the 10 lachter level.—Fahrenberg: Robert's shaft is now 7¼ lachters below the adit level, and I never saw the lode looking so well as it is in the present bottom since we commenced sinking below the adit level, but the water has so much increased that it is impossible to sink any deeper with the power employed.—James Watt: The lode in the eastern end is presenting a better appearance than I have seen it since we commenced driving, being fully 1¼ ft. wide, and producing fine stones of lead. The lode in the western end is at present small, but I fancy the main part of the lode is standing to the south side of the level, which will be proved in a few days. We have six men in each end, and the price for driving is 15 thalers per lachter. I calculate for them to extend 12 lachters per month. The estimated quantity of ores raised in Dec. is 15¼ tons.

G. Sweet, Jan. 17.—Bleibach: In cutting a plat in the 10 lachter level, at Wright's shaft, we have intersected a branch which is letting out a great quantity of water, and producing good stones of lead ore. I shall be able to say more about it in my next report. The lode in the end, driving west, is at present small, but grey. The lode in the winze sinking on the north lode will produce 20 centners of lead ore per lachter. No. 1 stope is not so good, in consequence of its contiguity with the cross-course. No. 2 stope is without alteration. We are extending the cross-cut as fast as possible from the bottom of Astley's shaft. We have now plenty of water for the wheels, and I trust that we shall experience no further hindrance from the frost this winter.—Fahrenberg: Robert's shaft is now idle, in consequence of there being more water than could be drawn with manual power. The stopes on the new lode are not so good in the back. We have not found any ore in the end since the intersection of the cross branches. In the bottom of the level we intend to commence a new stope, where the lode is pretty good.—James Watt: We are making good progaess in extending the ends east and west, but the lode is not so productive as it has been, yet in a short distance we may find an improvement. The engine is working well.

CENTRAL AMERICAN.—Alotepeque, November 30: San Pantaleon Mine: We regret to say that in consequence of the repeated breakages of the rods in Cornubia engine-shaft we have not forked the water low enough to do anything in driving during the last month in the San Alfonzo, or the 40, but the ends, both east and west of Cornubia engine-shaft, are again dry, and re-set to six men in each end. Our deep adit, we are glad to say, was holed on Nov. 29, 1864, west of Taylor's engine-shaft, and in a few days we shall throw off six drawing-lifts from Cornubia engine, which will greatly ease it, and the water will be carried back to Taylor's engine-shaft through San Ricardo level. We shall now prepare to drive east of Taylor's engine-shaft at the 40, in order to communicate with Cornubia engine-shaft at this depth; here we have yet 32 fms. to drive. The ground in the San Juan, or the 10 fm. level cross-cut, driving south-east on the eastern side of No. 3 cross-course, is favourable for driving through; here we are in search of the heaved portion of the lode.—Stopes: The No. 3 stope, above San Felipe level, and west of No. 2 winze, will be wrought through in a few days from this date, there being left only a small arch to take away. The No. 12 stope is finished, leaving only a small unproductive arch to the east of No. 2 winze above San Felipe level. Doble's stope below San Felipe level, east of No. 1 winze, is worth 1 to 2 cwts. of low quality ore per vara. The lode in the stope (No. 1) above San Alfonso level, and east of No. 1 winze, is worth 2 cwts. of ore per vara. We have set two men to rise above San Juan level, east of Cornubia engine-shaft, against the No. 7 stope, below Dolores adit, thinking whether we shall meet with a little ore at this level.—San Carlos Mine: The Esperanza deep adit level, driving east into the eastern hill, is very much disordered, having branches of flookan in the present end, with different bearings and underlies, and suspecting that Carrera's lode is still standing north of the level, we have turned north in search of it. The lode in San Rafael new level, driving east, is 2½ ft. wide, composed of flookan, quartz, and ore, worth of the latter 2 cwts. of fair quality per vara. We have commenced a new winze below this level, to be called Juan's winze; here the lode is 1 ft. wide, worth 1 cwt. of ore per vara. We are pushing on this winze as fast as possible to communicate with the Esperanza deep adit. The lode in the stopes above San Rafael adit level, are worth 4 cwts. of good quality silver ore per vara.—Duarte's Lode: The lode in Quijada's winze, sinking below the old adit level, is 1½ ft. wide, composed of flookan and a little quartz, and from the unproductive appearance of the lode we deem it necessary to suspend the sinking of this winze. The ground in the new cross-cut, driving south into the western hill towards Carrera's lode, is hard for excavation; here we are looking for a speedy change for the better, as we expect to be nearing the lode.

The superintendent, under date Dec. 2, reports that the yield of ore from San Pantaleon in November was 19 tons 14 cwts., assaying 62 ozs. of silver in the ton, and, therefore, equal to 1221½ ozs. of silver. He hopes that during the present month the stoping of the ground between San Felipe and Alfonso levels will augment the return of ore from this mine. A new winze is being carried down from the former to the latter, which contains a little ore in the bottom, and another will be commenced as soon as possible. In San Carlos Mine the returns have improved both in quantity and quality, being 23 tons, 11 cwts., assaying 95 ozs. of silver per ton, equal to 2237 ozs., which have been extracted almost entirely from the stopes in the back of the San Rafael shallow adit level. The ore branches in these stopes have produced 10 cwts. per vara during the month, and as they continue the same in appearance, a similar yield during the present month may be hoped for. In the hacienda de San José a satisfactory result has been obtained from reworking the slimes, which is being proceeded with. The next conducta, being the 25th, was expected to consist of 16 or 17 bars of silver, and would be dispatched to the Mint of Guatemala early in January, the produce of which is estimated at $12,000 to $12,750.

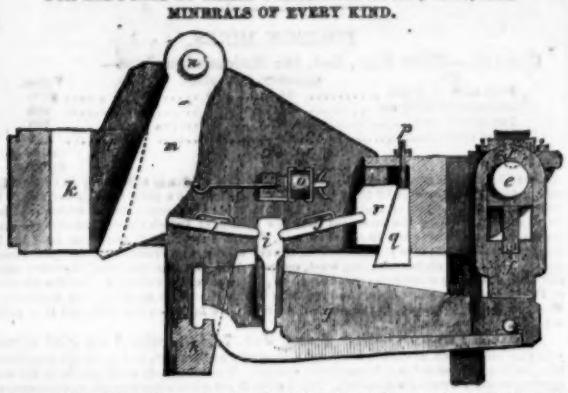
THE NOVA SCOTIA LAND AND GOLD CRUSHING AND AMALGAMATING COMPANY have received a remittance of 38 ozs. 1 dwt. 13 grs. From Oldham the agent writes:—we have succeeded in getting the Britannia lode, for which we have been prospecting for some time, and have commenced to sink on it. This lode in the adjoining claim is full 24 in. thick, and at the last crushing gave 11 ozs. to 4 tons of quartz. The Davies lode is looking very encouraging in the bottom of the shaft, which is now at the depth of 38 ft. The lodes, which were three in number, at the depth of 30 feet run together, forming one large lode of about 3¼ ft. thick, which now shows a quantity of very fine gold, but in consequence of the shaft being so near the swamp during the heavy rains we were obliged to abandon it for a few days, and commenced in the meantime to sink on the lode further east on the rising ground. We shall have no difficulty in keeping both crushers running day and night.

GOLD FIELDS IN SOUTH AMERICA.—That the *Auri sacra fames* holds as absorbing a position in the human mind as it did when sung of by the Latin poet, nearly two thousand years, ago is evident from daily experience. Australia and California have had their gold fevers, and now it seems as if the cycle were coming round to the Argentine territory, perhaps to prove that the titles of "Argentine" and "La Plata," given to it by the early Spanish discoverers, were not so much of misnomers after all. The papers from the interior provinces are filled with glowing accounts of the discovery of gold fields in the province of St. Juan, and near where Major Rickard is working the silver mines. The place where the gold has been found is called Castano. The *Riojano* (a paper published in the capital of the adjoining province of Rioja) of Oct. 21 states:—"A great excitement was felt all over the province on the discovery of the Castano gold fields. The nuggets brought to the city, and shown to everybody, are so rich and varied as to baffle all description, the virgin ore being a network, threads, and lumps of the precious metal. The first lot extracted consisted of a ton (medio cajon) of ore. This mine of fabulous riches has a thousand claimants, all at law with each other, with counting the numberless robberies and tricks going on at Castano. An experienced assayer examined the metals, and reports the ley to be 1·17 mark of pure gold, which is equivalent to a thousand ounces of gold per cajon (2000*l.* sterling per ton). The stories of the "Arabian Nights" are outdone. Here is the gold to be seen by anyone, and the excitement of the discovery is intense." No doubt the interest excited by the discovery may be attributed to the possibility of foreigners coming to prospect. Another paper, the *Zonda* of San Juan, says "every day the wonder increases. The latest ores taken at the mining-works at Hilario gave 325 lbs. of pure gold per cajon (8000*l.* sterling per ton) of quartz. The discoveries are at Castano, in Major Rickard's property, and his agent, D. Antonio Oro, has presented to the Diputado de Minas a petition praying for the embargo and seizure of all the metals extracted. The matter is far more important than we thought."

THE AMERICAN PETROLEUM TRADE.—Prof. Draper, of the University of New York, has just published a paper, embodying some very curious commercial details respecting this remarkable substance, from which it appears that the value of the quantity of American petroleum sent into the market during the year just ended amounted to no less than fifteen millions sterling, being fully one-fourth of the value of the largest cotton crop ever raised in the United States. Considering that the first of the wells from which the petroleum is obtained was sunk not more than four years ago, there is no more wonderful instance of rapid development in the whole history of commerce. In various parts of the world, during the last fifty years, fortunes have often been made rapidly, but never more rapidly than by the luckly owners of the sites of the American petroleum wells. One of these fortunate gentlemen, a Mr. John Steele, is now deriving an income equal to 150,000*l.* a year from a piece of land which four years ago did not yield annually more than as many pence. Farms which in 1859 would have been thought to have sold well if they had fetched 400*l.* each, have since sold for sums varying from 120,000*l.* to 200,000*l.* each. There is a little strip of land, about twenty miles long, and averaging two miles broad, in Oil Creek Valley, in Western Pennsylvania, which is now valued at 50,000,000*l.* sterling, but which until 1860 would not have sold for a sixpence more than twenty shillings an acre, or a total for the whole slip of about 25,000*l.* Its value has thus increased within four years twenty thousand fold!

IRON MANUFACTURERS AMONGST THE AFRICANS.—The nodules of ore are generally smelted in the forests, and brought in a lump to the smith, who by means of stone anvils and stones as sledge-hammers, converts it into a long rod; and finally, by a hand-vice, and grease from a small pot he carries, it is tied between two posts and drawn till it becomes a thread. It is now fit, after being once heated, for being twisted neatly with the finger and thumb round a few hairs from the tail of a cow, or the thicker hair of a giraffe. In this state it is worn in rings ornamenting the ankles of men and women, fifteen of them costing one string of beads, value a halfpenny, and fifteen copper or brass ones being double price. Iron hoes, adzes, grass-hooks, small knives, pincers, &c., are all made up by the natives in the above rude way, and this is the extent of their knowledge in ironwork.

BLAKE'S PATENT STONE BREAKER,
OR ORE CRUSHING MACHINE,
FOR REDUCING TO SMALL FRAGMENTS ROCKS, ORES, AND MINERALS OF EVERY KIND.



It is rapidly making its way to all parts of the globe, being now in profitable use in California, Washoe, Lake Superior, Australia, Cuba, Chili, Brazil, and throughout the United States and England.

The above section illustrates Blake's Stone Breaker, just as made the last five years, and is fully protected in every part by patents.

Extract from Specification:—A short but powerful vibration is imparted to one or both of the jaws by any convenient arrangement, and combination of powerful levers, worked by a crank or eccentric on the main shaft.

LEGAL PROCEEDINGS will be taken at once against any person or persons found making, using, or vending any machine, the construction of which will constitute an infringement on the above patent. Read extracts of testimonials:—

Alkali Works, near Wednesbury.—I at first thought the outlay too much for so simple an article, but now think it money well spent. WILLIAM HUNT.

Welsh Gold Mining Company, Dolgelly.—The stone breaker does its work admirably crushing the hardest stones and quartz. WM. DANIEL.

Our 15 by 7 in. machine has broken 4 tons of hard winstone in 20 minutes, for fine road metal, free from dust. Messrs. ORD and MADDISON, Stone and Lime Merchants, Darlington.

Kirkless Hall, near Wigan.—Each of my machines breaks from 100 to 120 tons of limestone or ore per day (10 hours), at a saving of 4d. per ton. JOHN LANCESTER.

Oreca, Ireland.—My crusher does its work most satisfactorily. It will break 10 tons of the hardest copper ore stone per hour. WM. G. ROBERTS

General Frémont's Mines, California.—The 15 by 7 in. machine effects a saving of the labour of about 30 men, or $75 per day. The high estimation in which we hold your invention is shown by the fact that Mr. Park has just ordered a third machine for this estate. SILAS WILLIAMS

For circulars and testimonials, apply to—

H. R. MARSDEN, SOHO FOUNDRY,
MEADOW LANE, LEEDS.
Only maker in the United Kingdom.

Gun Cotton Manufactory.

MESSRS. THOMAS PRENTICE AND CO.,
GREAT EASTERN CHEMICAL WORKS, STOWMARKET, SUFFOLK.

This manufactory has been established for the purpose of preparing GUN COTTON, according to the Austrian process, and was opened on the 26th of January last, under the inspection of Baron Lenk. Messrs. Thomas Prentice and Co. are now able to SUPPLY GUN COTTON, in its most approved form, either for the purposes of engineering and mining, or for military and submarine explosion, and for the service of artillery, as a substitute for gunpowder.

The advantages of Baron Lenk's GUN COTTON are the following:—

FOR PURPOSES OF ARTILLERY.—The same initial velocity of the projectile can be obtained by a charge of gun cotton one-fourth of the weight of gunpowder. There is no smoke from the explosion of gun cotton; it does not foul the gun, nor heat it to the injurious degree of gunpowder. There is much smaller recoil of the gun. The same initial velocity of projectile is produced, with a shorter length of barrel. In projectiles of the nature of explosive shells it breaks the shell more equally into much more numerous pieces than gunpowder. When used in shells, one-third the weight of gun cotton produces double the explosive force of gunpowder.

FOR CIVIL ENGINEERING AND MINING.—In driving tunnels through hard rock a charge of gun cotton of given size exerts double the explosive force of gunpowder, thus a smaller number of holes is necessary. It may be so used as, in its explosion, to reduce the rock to much smaller pieces than gunpowder, and so facilitate its removal. As gun cotton produces no smoke, the work can proceed much more rapidly, and with less injury to the health of the miners. In working coal mines the advantages of bringing down much larger quantities of material with a given charge, and the absence of smoke in the explosion, enable a much greater quantity of work to be done in a given time at a given cost. The weight of gun cotton required to produce a given effect in mining is only one-sixth part of the weight of gunpowder. In blasting rock under water the wider range and greater force of a given charge is a great element in cheapening the cost of submarine work. The peculiar local action of gun cotton, to which the effects of gunpowder show no analogy, enables the engineer to destroy and remove submarine stones and rocks, without the preliminary delay and expense of boring chambers for the charge.

FOR MILITARY ENGINEERING.—The facility of transport is increased, the weight of gun cotton being one-sixth that of gunpowder. The peculiar localised action of gun cotton facilitates the destruction of bridges and palisades, and every obstacle. For submarine explosion, gun cotton has the advantage of a much wider range of destructive power than gunpowder. For the same purpose gun cotton, from its lightness, has the advantage of keeping afloat the water-tight case in which it is contained, while gunpowder sinks it to the bottom.

FOR NAVAL WARFARE.—In the batteries of ships, between decks, and in casemated forts, the absence of smoke facilitates continuous rapid firing. The absence of fouling and of heating are equally advantageous for naval as for military artillery.

GENERAL ADVANTAGES.—Time, damp, and exposure do not alter the qualities of the patent gun cotton. It has already been preserved 10 years without injury or decay. It can be transported through fire without danger, simply by being wetted, and when dried in the open air it becomes as good as before. In the case of a ship, or a fortress, or a city being on fire, this quality may be of the greatest value. It is much safer than gunpowder, owing to its being manufactured in the shape of rope or yarn. It cannot escape from its package, or be spilled by accident. The patent gun cotton is entirely free from the danger of spontaneous combustion, and secures that degree of safety and certainty which, at the time of the original invention, the gun cotton of Schönbein did not possess.

Messrs. THOMAS PRENTICE and Co. are now in a position to contract with the owners of mines, engineers, contractors, and governments for gun cotton prepared in the various forms required for their use. Mining charges will be supplied in the rope form, according to the diameters of bore required, and gun cotton match-line, as well as instructions for using it in mines, will be supplied with it.

The great advantage of gun cotton make its use in practice very much cheaper than its comparative price would appear to show; in blasting rock, for example, the rapidity and quantity of the work done, with a given expense of wages, &c., is largely in favour of gun cotton.

Messrs. THOMAS PRENTICE and Co. are also prepared to manufacture the gun cotton, and deliver it in the form of gun cartridges, adapted to every description of ammunition; all they require for this purpose being a drawing of the gun, gunpowder cartridges, and ammunition, with the specification of weights, sizes, and initial velocities.

Artillerists who prefer to manufacture their own cartridges may make special arrangements with the patentee through Messrs. PRENTICE and Co.

Stowmarket, March 10 1864.

BASTIER'S PATENT CHAIN PUMP,
APPARATUS FOR RAISING WATER ECONOMICALLY, ESPECIALLY APPLICABLE TO ALL KINDS OF MINES, DRAINAGE, WELLS, MARINE, FIRE, &c.

J. U. BASTIER begs to call the attention of proprietors of mines, engineers, architects armers, and the public in general, to his new pump, the cheapest and most efficient ever introduced to public notice. The principle of this new pump is simple and effective, and its action is so arranged that accidental breakage is impossible. It occupies less space than any other kind of pump in use, does not interfere with the working of the shafts, and unites lightness with a degree of durability almost imperishable. By means of this hydraulic machine water can be raised economically from wells of any depth; it can be worked either by steam-engine or any other motive power, by quick or slow motion. The following statement presents some of the results obtained by this hydraulic machine, as daily demonstrated by use:—

1.—It utilises from 90 to 92 per cent. of the motive power.
2.—Its price and expense of installation is 75 per cent. less than the usual pumps employed for mining purposes.
3.—It occupies a very small space.
4.—It raises water from any depth with the same facility and economy.
5.—It raises with the water, and without the slightest injury to the apparatus, sand, mud, wood, stone, and every object of a smaller diameter than its tube.
6.—It is easily removed, and requires no cleaning or attention.

BASTIER'S PATENT CHAIN-PUMP may be seen daily in operation at Messrs. SAMUEL BERGER and Co.'s Patent Rice Starch Works, Bromley-by-Bow, London, E. Cards of admission to be had on application to the inventor and patentee, Mr. J. U. BASTIER, C.E., 12, Gower-street North, London.

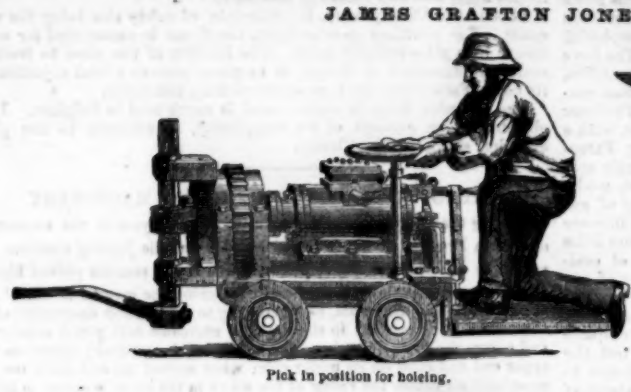
J. U. BASTIER, sole manufacturer, will CONTRACT to ERECT his PATENT PUMP at HIS OWN EXPENSE, and will GUARANTEE IT FOR ONE YEAR, or will GRANT LICENSES to manufacturers, mining proprietors, and others, for the USE of his INVENTION.

OFFICES, 12, GOWER STREET NORTH, LONDON.
London, March 21, 1859. Hours from Ten till Four. J. U. BASTIER C.E.

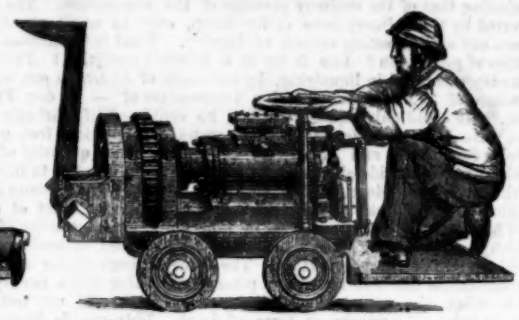
THE STOCKTON AND HARTLEPOOL MERCURY AND
MIDDLESBOROUGH NEWS (published at Hartlepool) is eminently the organ of the Coal, Iron, and Iron Ship-building Trades in the extensive Mining and Maratime District of South Durham and Cleveland, with which it has been closely identified since its origin. The "Mercury" was for years the only newspaper published in South Durham and Cleveland, and is yet the only one published more than once a week. Advertisements to be forwarded to the publisher, Mr. JOHN H. BELL, Southgate, Hartlepool.

THE NEWCASTLE CHRONICLE AND NORTHERN
COUNTIES ADVERTISER. (ESTABLISHED 1764).
Published every Saturday, price 2d., or quarterly 2s. 2d.
THE DAILY CHRONICLE AND NORTHERN COUNTIES ADVERTISER.
Published every morning, price 1d.
Offices, 42, Grey-street, Newcastle-upon-Tyne; 50, Howard-street, North Shields; 195, High-street, Sunderland.

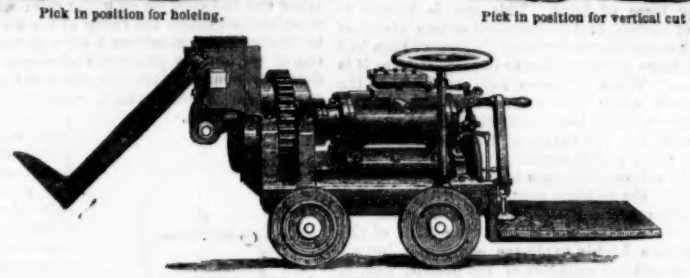
COAL CUTTING MACHINERY.
JAMES GRAFTON JONES'S PATENT.



Pick in position for holeing.



Pick in position for vertical cut downwards.



Pick in position for vertical cut upwards.

Messrs. JONES and LEVICK, proprietors of this patent, are prepared to supply these Machines, which are on an improved principle, and are constructed to work the coal at any angle from the horizontal to the vertical, thus rendering them capable of "holeing" at any angle, and of driving "headings." They are simple and substantial in construction, and are not likely to get out of order. They are already successfully employed in the Barnsley coal district, and are being introduced into the South Wales and other coal mining districts. They are also suitable for mining the argillaceous ironstones of the coal measures, as well as working other mines and quarries.

N.B.—Air Compressing Machinery will be supplied, or plans and specifications furnished.

Applications to be made to Messrs. FREDERICK LEVICK and Co., 4, Charlotte-row, Mansion House, London; or Messrs. LEVICK and SIMPSON, Blaina Ironworks, near Newport, Monmouthshire.

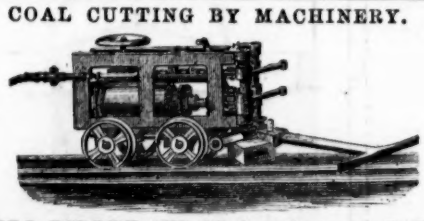
COAL CUTTING MACHINERY.—
The WEST ARDSLEY COMPANY having, by recently patented improvements, perfected their coal cutting machinery, worked by compressed air, are NOW READY to MAKE CONTRACTS for the CONSTRUCTION and USE of their MACHINES.

The results of twelve months' experience in the working of these machines, by the West Ardsley Company, have proved most satisfactory, their use being found to CHEAPEN the COST and IMPROVE the average SIZE of the COAL, to LIGHTEN the LABOUR, and also to MODIFY the SANITARY CONDITION of the MINE.

All communications to be made to Messrs. FIRTH, DONISTHORPE, and BOWER, No. 8, Britannia-street, Leeds.

NOTICE.—The WEST ARDSLEY COMPANY, having reason
to believe that their patents are being infringed upon, hereby give notice that they will TAKE LEGAL PROCEEDINGS AGAINST ALL PARTIES who may MAKE FOR SALE, or USE ANY MACHINERY in the construction of which any such INFRINGEMENT is MADE.

COAL CUTTING BY MACHINERY.



MESSRS. RIDLEY AND CO. have, by recently PATENTED
IMPROVEMENTS, COMPLETED their TRUNK COAL CUTTING MACHINE, WORKED by COMPRESSED AIR, and are NOW PREPARED to NEGOCIATE for the USE, and to SUPPLY MACHINES, which will be found to COMBINE SIMPLICITY of CONSTRUCTION with PORTABILITY and ECONOMY in WORKING. By the use of these machines a CONSIDERABLE SAVING of COAL is EFFECTED, and the COST of LABOUR MUCH REDUCED. Each machine will be guaranteed as to its capabilities, &c.

All applications to be made to Messrs. RIDLEY and Co., No. 11, South-street, Finsbury London, E.C.; or Mr. PERCY BANKART, agent, 9, Clement's-lane, E.C.

*** COLLIERY PROPRIETORS are CAUTIONED against PURCHASING or USING MACHINES, the construction of which will constitute an INFRINGEMENT of the ABOVE PATENT.

MESSRS. KNOWLES AND BUXTON, CHESTERFIELD.
MANUFACTURERS OF PATENT TUBULAR TUYERES.

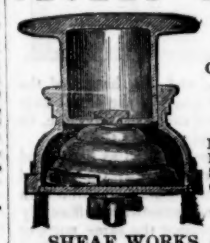
The PATENT TUBULAR TUYERE possesses GREAT ADVANTAGES over the ORDINARY TUYERES, both for its DURABILITY and EASY WORKING. A current of cold water going direct to the nozzle prevents their destruction, however much they may be exposed to the fire.

We repair them at half the first cost, making them equal in size to new ones, all parties returning them carriage paid.

No. 1 tuyere,	16 in.	long	28s. each.
No. 2 "	18 "	"	32s. "
No. 3 "	20 "	"	36s. "
No. 4 "	22 "	"	40s. "
No. 5 "	24 "	"	44s. "

Delivered at Chesterfield station. Terms, nett cash quarterly.

THOMAS TURTON AND SONS,
MANUFACTURERS OF



CAST STEEL for PUNCHES, TAPS, and DIES, TURNING TOOLS, CHISELS, &c.
CAST STEEL PISTON RODS, CRANK PINS, CONNECTING RODS, STRAIGHT and CRANK AXLES, SHAFTS and FORGINGS of EVERY DESCRIPTION.

DOUBLE SHEAR STEEL,
BLISTER STEEL,
SPRING STEEL,
GERMAN STEEL.

FILES MARKED T. TURTON.
EDGE TOOLS MARKED WM. GREAVES & SON

Locomotive Engine, Railway Carriage and Wagon Springs and Buffers.

SHEAF WORKS AND SPRING WORKS, SHEFFIELD.
LONDON WAREHOUSE,—35, QUEEN STREET, CANNON STREET, CITY, E.C.
where the largest stock in the world may be selected from.

MESSRS. W. EASSIE AND CO.,
RAILWAY SAW MILLS, MOULDING SHOPS, &c., AND GENERAL TIMBER CONVERTING YARDS,
HIGH ORCHARD, GLOUCESTER,

Are PREPARED to FURNISH QUOTATIONS for any description of WOOD FITTINGS for home or foreign RAILWAY STATIONS, BARRACKS, EXHIBITIONS, DWELLINGS, WAREHOUSES, FACTORIES, STORES, GLASS HOUSES, &c.

They will also CONTRACT for WOODEN FITTINGS of ANY KIND in CONNECTION with IRON BUILDINGS, &c.

The above would in all cases be consigned ready fitted, so as to ensure speedy re-erection.

Numerous drawings of works of the above nature, already executed, can be seen on application, and references permitted to the engineers thereof.

The above Firm supply Barrows, Carts, Wagons, temporary Huts, permanent Shedding, and every description of Miners' and Contractors' Tools, at the very lowest prices. References can be given where many thousands of the above have been supplied to different parts of the world. Prices quoted on application. Delivered to any station, or home or foreign port.

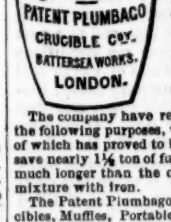
International Exhibition, 1862—Prize Medal.

JAMES RUSSELL AND SONS
(the original patentees and first makers of wrought-iron tubes), of the CROWN PATENT TUBE WORKS, WEDNESBURY, STAFFORDSHIRE, have been AWARDED a PRIZE MEDAL for the "good work" displayed in their wrought-iron tubes and fittings.

Warehouse, 81, Upper Ground-street, London, S.

Prize Medals—International Exhibition, Class 1 and 2.

PATENT PLUMBAGO CRUCIBLES.—
The CRUCIBLES manufactured by the PATENT PLUMBAGO CRUCIBLE COMPANY are the ONLY KIND for which a MEDAL has been AWARDED, and are now used exclusively by the English, Australian, and Indian Mints; the French, Russian, and other Continental Mints; the Royal Arsenals of Woolwich, Brest, and Toulon, &c.; and have been adopted by most of the large ENGINEERS, BRASSFOUNDERS, and REFINERS in this country and abroad. The GREAT SUPERIORITY of these melting pots consists in their capability of melting on an average 40 pourings of the most difficult metals, and a still greater number of those of an ordinary character, some of them having actually reached the EXTRAORDINARY NUMBER of 96 meltings. They are unaffected by change of temperature, never crack, and become heated much more rapidly than any other crucibles. In consequence of their great durability, the saving of waste is also very considerable.



The company have recently introduced CRUCIBLES SPECIALLY ADAPTED for the following purposes, viz.:—MALLEABLE IRON MELTING, the average working of which has proved to be about seven days; STEEL MELTING, which are found to save nearly 1¼ ton of fuel to every ton of steel fused; and for ZINC MELTING, lasting much longer than the ordinary iron pots, and saving the great loss which arises from mixture with iron.

The Patent Plumbago Crucible Company likewise manufacture and import Clay Crucibles, Muffles, Portable Furnaces, &c., Stove Backs, all descriptions of fire-standing goods, and every requisite for the Assayer and Dentist.

For lists, testimonials, &c., apply to the Patent Plumbago Crucible Company, Battersea Works, London, S.W.

First Class Silver Medal, Royal Polytechnic Society, Falmouth, 1864.

CREASE'S PNEUMATIC TUNNELLING ENGINE,
for SUPERSEDING the SLOW and EXPENSIVE USE of MANUAL LABOUR in SINKING SHAFTS, DRIVING LEVELS, TUNNELLING, &c., is guaranteed to drive through any rock of average hardness at a minimum rate of 1 fm. per diem, and to sink shafts at the rate of 2 fms. in three days.

Mr. CREASE will undertake contracts for sinking shafts, driving levels, &c., at an enormous reduction of time and great saving in cost.

Applications to be addressed (for the present) to the patentee, Mr. E. S. CREASE, Tavistock, Devon.

Works published at the MINING JOURNAL *office, 26, Fleet-street, London.*

PRACTICAL TREATISE ON MINE ENGINEERING. By G. C. GREENWELL. In one vol., half-bound, £2 15s.; whole bound in Morocco, £3 10s. In two vols., half-bound, £3 3s.
TREATISE ON IRON METALLURGY. By S. B. ROGERS. £1 5s.
STATISTICS OF MINING (ANNUAL). By W. H. CUELL. 6d.
"CORNISH NOTES"—NEW SERIES. By J. Y. WATSON, F.G.S. 1s.
RISE AND PROGRESS OF MINING IN DEVONSHIRE. By G. CHOWEN. 1s.; by post, 1s. 1d.
SLATE QUARRIES IN WALES. By T. C. SMITH. 1s.
NEW GUIDE TO THE IRON TRADE, OR MILL MANAGERS' AND STOCKTAKERS' ASSISTANT. By JAMES ROSE. 8s. 6d.
STOCKTAKERS' ASSISTANT AND OFFICE COMPANION. By J. PARIS. 7s. 6d.
MINING AND SMELTING MAGAZINE. Monthly. 1s. 6d.
VENTILATION OF MINES, FOR THE USE OF UNDERGROUND MANAGERS AND OVERMEN. By RALPH MOORE. 5s.
SECTION OF LANARKSHIRE COAL MEASURES (NEW EDITION). By RALPH MOORE. 10s. 6d.
MINERS' MANUAL OF ARITHMETIC AND SURVEYING. By WM. RICKARD. 10s. 6d.; by post, 11s.
TRANSACTIONS OF THE NORTH OF ENGLAND INSTITUTE OF MINING ENGINEERS. Eleven volumes: 21s. per volume. [Single copies can be had.]
TABLES FOR ASCERTAINING THE VALUE OF TINSTUFF. By Capt. CHARLES THOMAS. 5s.
TAPPING'S HIGH PEAK MINING CUSTOMS. 5s.
TAPPING'S HANDYBOOK ON MERCANTILE, MINING, AND OTHER JOINT STOCK COMPANIES. 2s. 6d.
THE COST-BOOK—TAPPING'S PRIZE ESSAY—WITH NOTES AND APPENDIX. 5s.
TAPPING'S DERBYSHIRE MINING CUSTOMS. 6s.
BOOK-KEEPING BY DOUBLE ENTRY, EXPRESSLY ADAPTED FOR THE IRON TRADE. By G. J. WILLIAMS. Cloth, 10s. 6d.
MINING JOURNEY ACROSS THE GREAT ANDES. By Major RICKARD. 7s. 6d.
TAPPING'S COLLIERY AND ORE MINE INSPECTION AND TRUCK ACTS. Cloth, 6s.
TAPPING'S EDITION OF MANLOVE'S CUSTOMS OF THE LEAD MINES OF DERBYSHIRE. 3s.
COST-BOOK SYSTEM—ITS PRINCIPLES AND PRACTICE. 6d.
MINES AND MINING COMPANIES (A Practical Treatise on the Relating to). By WHITTON ARUNDELL. 4s.
MINERS' TABLES. By W. WHITBURN. 4s.
ON COPPER SMELTING. By HYDE CLARKE, C.E. 1s.
MANUAL FOR EXPLORERS. By J. L. WILLSON and C. ROSS. 1s. 6d.
THE ORIGINAL LOCOMOTIVE BY TREVITHICK. On fine paper, 2s.
MINING GLOSSARY—English and Foreign Mining and Smelting Terms. (SECOND EDITION). 2s.
REMARKS ON THE GEOLOGY OF CORNWALL AND DEVON. By Capt. CHAS. THOMAS, of Dolcoath Mine, Cornwall. 1s. 6d.
FORM OF "TACK-NOTE." 5s.
VENTILATION OF COAL MINES. 3d.
GEOLOGICAL MAP OF THE CROWAN AND WHEAL ABRAHAM MINING DISTRICTS. By BRENTON SYMONS, M.E. Coloured, 15s.; mounted, 21s.
MINES OF CORNWALL AND DEVON (Statistics of, and Observations on), by T. SPARGO. 5s.; by post, 5s. 4d.
MASTERS AND WORKMEN. By MARK FRYAR. 6d.
CORNWALL AND DEVON MINING DIRECTORY. 1s. 6d.
CONVERSATION ON MINES, &c., BETWEEN "A FATHER AND SON." By W. HOPTON, Colliery Manager. 2s. 6d.; by post, 2s. 8d.
INVENTIONS, IMPROVEMENTS, AND PRACTICE, OF A COLLIERY ENGINEER AND GENERAL MANAGER. By BENJAMIN THOMPSON. 6s.

LONDON: Printed by RICHARD MIDDLETON, and published by HENRY ENGLISH (the proprietors), at their office, 26, FLEET-STREET, where all communications are requested to be addressed. [Jan. 21, 1865.